

## CLAIMS

What is claimed is:

1. A method for developing an information system through multiple development phases, comprising:

5 at one or more design phases, validating an information system design by comparing performance metrics calculated from a predictive model of the design against a set of predefined performance requirements, ensuring that the design satisfies the set of performance requirements at each design phase; and

10 proceeding to a further development phase if the design is validated.

2. The method of claim 1, further comprising:

15 at one or more construction phases, validating a prototype of at least a portion of the information system described in a validated design by comparing performance metrics calculated from a predictive model of the validated design against actual performance metrics obtained from the prototype, ensuring the prototype conforms to the predictive model.

3. The method of claim 1, further comprising:

20 modifying the design if the calculated performance metrics do not satisfy the set of performance requirements;

validating the modified design by comparing updated performance metrics calculated from a predictive model of the modified design against the set of performance requirements, ensuring that the modified design satisfies the set of performance requirements; and

proceeding to a further development phase if the modified design is validated.

4. The method of claim 3, wherein modifying the design comprises scaling the number or kind of components of the design.
5. The method of claim 1, further comprising:
  - providing a description of business components and interactions from a business design;
  - generating a predictive model of the information system comprising a business layer, an application layer, and a system layer, the business layer being generated from the description of the business components and interactions, the application and system layers being generated by associating each business component in the business layer to default application and system component models; and
  - calculating performance metrics from the business layer to validate the business design.
6. The method of claim 5, wherein the default application and system component models are selected from a standard component library.
7. The method of claim 1, further comprising:
  - providing a description of business components, application components, system components, and interactions from a design;
  - generating a predictive model of the information system comprising a business layer, an application layer, and a system layer, the business layer being generated from the descriptions of the business components and interactions, the application layer being generated with standard or customized application component models matching the

descriptions of the application components and interactions, the system layer being generated with standard or customized system component models matching the descriptions of the system components and interactions; and

5 generating performance metrics from the business, application, and system layers to validate the design.

8. The method of claim 1, further comprising:

performing a cost analysis on the validated design to determine whether to proceed to a further development phase.

10 9. A method for developing an information system through multiple development phases, comprising:

at one or more construction phases, validating a prototype of at least a portion of an information system constructed from a validated design by comparing performance metrics calculated from a predictive model of the validated design against actual performance metrics obtained from the prototype, ensuring the prototype conforms to the predictive model; and

15 proceeding to a further development phase if the prototype is validated.

20 10. The method of claim 9, further comprising:

calculating performance metrics from the predictive model in response to different workload type or volume;

obtaining actual performance metrics from the prototype in response to different workload types or volume; and

comparing the actual performance metrics against the calculated performance metrics to verify conformance of the prototype to the predictive model.

11. The method of claim 11, further comprising:
  - 5 modifying the prototype such that the actual performance metrics conform to the calculated performance metrics of the predictive model.
12. The method of claim 10, further comprising:
  - 10 replacing application or system component models in the predictive model if a component described in the validated design is substituted in the prototype.
13. The method of claim 1, wherein the calculated performance metrics are used to evaluate tradeoffs in maintaining components that implement services for enhancing quality and robustness of the information system, but result in performance metrics that do not satisfy business or performance requirements.
- 15 14. A system for developing an information system through multiple development phases, comprising:
  - 20 at one or more design phases, a performance metric calculation module calculating performance metrics from a predictive model of an information system design;
  - 25 a construction module validating the information system design by comparing the calculated performance metrics against a set of predefined performance requirements, ensuring that the design satisfies the set of performance requirements at each design phase; and proceeding to a further development phase if the design is validated.

15. The system of claim 14, further comprising:  
at one or more construction phases, the performance metric  
calculation module calculating performance metrics from a predictive  
model of a validated information system design;

5 a prototype of at least a portion of the information system being  
constructed from the validated design;  
the prototype being validated by comparing the calculated  
performance metrics against actual performance metrics obtained from  
the prototype, ensuring the prototype conforms to the predictive model.

10 16. The system of claim 14, further comprising:  
the design being modified if the calculated performance metrics  
do not satisfy the set of performance requirements;  
the performance metric calculation module calculating updated  
performance metrics from a predictive model of the modified design;

15 the construction module validating the modified design by  
comparing the updated performance metrics against the set of  
performance requirements, ensuring that the modified design satisfies the  
set of performance requirements; and  
proceeding to a further development phase if the modified design  
20 is validated.

17. The system of claim 16, wherein the design is modified by scaling the number or  
kind of components of the design.

18. The system of claim 14, further comprising:  
an input module providing a description of business components  
25 and interactions from a business design to the construction module;

the construction module generating the predictive model of the information system comprising a business layer, an application layer, and a system layer, the business layer being generated from the description of the business components and interactions, the application and system layers being generated by associating each business component in the business layer to default application and system component models; and

5 the performance metric calculation module calculating performance metrics from the business layer to validate the business design.

10 19. The system of claim 18, wherein the default application and system component models are selected from a standard component library.

15 20. The system of claim 18, further comprising:  
an input module providing a description of business components, application components, system components, and interactions from an information system design to the construction module;

20 the construction module generating a predictive model of the information system comprising a business layer, an application layer, and a system layer, the business layer being generated from the descriptions of the business components and interactions, the application layer being generated with standard or customized application component models matching the descriptions of the application components and interactions, the system layer being generated with standard or customized system component models matching the descriptions of the system components and interactions; and

25 the performance metric calculation module generating performance metrics from the business, application, and system layers to validate the design.

21. The system of claim 14, further comprising:  
a cost analysis being performed on the validated design to  
determine whether to proceed to a further development phase.

22. A system for developing an information system through multiple development  
5 phases, comprising:  
at one or more construction phases, a prototype of at least a  
portion of an information system being constructed from a validated  
design;  
10 a performance metric calculation module calculating performance  
metrics from a predictive model of the validated design;  
the prototype being validated by comparing the calculated  
performance metrics against actual performance metrics obtained from  
the prototype, ensuring the prototype conforms to the predictive model;  
and  
15 proceeding to a further development phase if the prototype is  
validated.

23. The system of claim 22, further comprising:  
the performance metric calculation module calculating  
20 performance metrics from the predictive model in response to different  
workload type or volume;  
actual performance metrics from the prototype being obtained in  
response to different workload types or volume; and  
25 the actual performance metrics being comparing against the  
calculated performance metrics to verify conformance of the prototype to  
the predictive model.

24. The system of claim 23, further comprising:  
the prototype being modified such that the actual performance metrics conform to the calculated performance metrics of the predictive model.

5 25. The system of claim 22, further comprising:  
application or system component models in the predictive model being replaced if a component described in the validated design is substituted in the prototype.

10 26. The system of claim 14, the calculated performance metrics being used to evaluate tradeoffs in maintaining components that implement services for enhancing quality and robustness of the information system, but result in performance metrics that do not satisfy business or performance requirements.